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U. S. DEPARTMENT OF AGRICULTURE

How to—

INCREASE COTTONSEED OIL PRODUCTION



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U. S. DEPARTMENT OF AGRICULTURE

Producing Cottonseed Oil Is Vital in the War Emergency

DURING this national emergency farmers are becoming increasingly aware that agricultural products must be viewed in terms of their ultimate use and the wartime needs. A bale of cotton now more than ever before is looked upon not as just so much lint plus seed, worth to its producer just so many dollars. The war-changed perspective reveals this bale as a long series of critically important products.

The lint fibers are seen as a variety of fabrics, yarns, and finished goods of all descriptions.

Linters become explosives and plastics. Cottonseed meal becomes high-quality flour, nutritious stock feed, and nitrogenous fertilizer.

Hulls are important as roughage in stock feeds and as a source of synthetic rubber and of certain valuable plastics.

With the Nation on rations, cottonseed oil becomes a highly nutritious food, nine-tenths of which finds its way into vegetable shortening, margarine, salad oil, salad dressing, and other edible products of high caloric food value.

Without adding to his cotton acreage, every farmer can in some measure increase his output of cottonseed oil by selecting the plant variety best adapted to high yields; protecting, reginning, and disinfecting his seed; and using the best fertilizer available. Thus will the Nation meet a critically important need.

This pamphlet was written by W. H. Tharp, Jr., physiologist, Division of Cotton and Other Fiber Crops and Diseases, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, based on recommendations of the joint investigations of the Division of Cotton and Other Fiber Crops and Diseases and the Arkansas Agricultural Experiment Station; various State and Federal experiment stations furnished cottonseed samples for analysis.

Every Farmer Can Help Meet the Need for Cottonseed Oil

It would seem obvious that in order to increase cottonseed oil production it would be necessary only to increase the cotton acreage. Shortage of labor, equipment, and other necessary materials, however, already puts on farmers a heavy task in meeting their established production quotas. The contribution of the individual cotton farmer therefore will have to be made through his increasing the acre yield of cottonseed oil. If every farmer should manage to get only 1 percent more oil per acre than last year, the aggregate increase of this highly nutritious product throughout the Nation would be at least 5,500 tons.

The variations in yield of oil and other cottonseed products have been studied extensively throughout the Cotton Belt by both State and Federal workers. Many of the factors associated with the variations in both the oil and the protein content have been found associated with soil, locality, and weather. Such variations are beyond the control of the farmer, but certain other factors are controllable and highly influential. The means for increasing the acre yield of cottonseed oil are available to all cotton farmers. A selected list of references to publications dealing with variations in cottonseed oil content is given at the end of this pamphlet.

Means are Available for Increasing Oil Production

Exclusive of variations due to soil, locality, and weather, the farmer can insure maintenance of capacity yields of cottonseed oil in the following ways: (1) Prevent field and

storage damage to seeds. (2) Conserve planting seed by ginning and disinfecting, in order to avoid losses due to poor germination and seedling diseases. (3) Use the most beneficial fertilizer available, in order to promote healthy plant growth and increase the yield of oil. (4) Select the cotton variety best adapted to high acre yields.

Prevent Field and Storage Damage to Cottonseed

The following important preventive measures, based on experiments conducted by members of the cotton seedling disease committee of the Cotton Disease Council, have been developed for avoiding damage to cotton seed:

1. Harvest cotton as soon as possible after opening.
2. Avoid harvesting wet cotton.
3. Before storing or ginning, sun-dry cotton that contains more than 12 percent moisture.
4. Avoid ginning wet cotton.
5. Segregate weathered and unweathered pickings.
6. Store seed properly—seed with a moisture content of not more than 11 percent, in loosely stacked bags; well-dried seed, in tight bins or metal containers.

Remember that every ton of cottonseed ruined through improper harvesting and storage represents a loss of about 310 pounds of highly nutritious food from the Nation's diet.

Conserve Planting Seed by Ginning and Disinfecting

Machine delinting is now recognized as a reliable means of improving the rapidity

and uniformity of germination and of allowing seed to germinate in the presence of a minimum of soil moisture. Removing the greater part of the fuzz also allows for a better disinfectant coating, thus reducing the quantity of the critical chemicals required. In addition to thus improving the condition of seed for planting, the linters saved can be turned into gunpowder. The treatment of cottonseed with the proper disinfectants cannot be too highly recommended. Besides assuring good stands and saving the labor of replanting, there is the all-important saving of cottonseed oil.

Using Potash Will Increase Seed Cotton and Oil Yields

Increase of acre yield of cottonseed oil through the use of fertilizers will result (1) when the acre yield of seed cotton is thereby increased and (2) when the percentage of oil in the seed is increased. Fertilizer recommendations made by the State agricultural colleges for special soil conditions and cropping systems, available through county agricultural agents, will aid the cotton farmer in determining what rate and ratio of fertilizer application will give economical increases in yields on his particular farm. On a soil thus responsive to such application, the farmer using the fertilizer not only will have added to his own income but also will have served his country through producing more lint, linters, meal, hulls, and cottonseed oil.

Nitrogen (N) and phosphorus (P) are important only as they increase the acre yield of seed cotton. Potash (K) affects both the yield of seed cotton and the percentage of oil in the seed. Benefits to be gained

Table 1.—Results of experiments at Tifton, Ga., in the use of potash for increasing yields of cottonseed oil

POTASH APPLICATION PER ACRE (Pounds)	YIELD OF COTTONSEED OIL—		
	In acid- delinted dry seed	In seed cotton at 10 percent moisture	Acre yield
	Percent	Percent	
20	19.7	9.8	78.4
40	21.8	10.8	103.6
80	23.7	11.8	131.7
Increase from first incre- ment (20 to 40 lb.)....	2.1	1.0	25.2
Increase from second incre- ment (40 to 80 lb.)....	1.9	1.0	28.1
Total increase	4.0	2.0	53.3

through the additions of potash, where this element is deficient or very low in the soil, are often outstanding. At the Coastal Plains Experiment Station, at Tifton, Ga., J. H. Turner is conducting a cotton-fertilizer experiment that will extend over a period of years. Four cotton varieties are being used, and the potash application has been at three rates (20, 40, and 80 pounds per acre). Complete results of this experiment are, of course, not yet published, but the benefits of potash addition that are being shown in this study are illustrated by table 1.

These results are expressed as the average performance of the four varieties. Although varieties differ in inherent comparative oil content and to some extent in response to potash fertilization, the results were relatively proportional for all varieties tested.

Often the types of soil where potash is depleted are further complicated with a serious infestation of the fusarium wilt organism. In most cases the restoration of adequate potash to these soils will not only cause a highly beneficial reduction of damage

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yield of oil. If the acre yield of seed cotton and the percentage of oil in the seed are similar, then the lower the gin turnout, the higher the percentage of seed and the higher the acre yield of oil. Similarly, with percentages of oil and gin turnout equal, the higher yielding variety would be the one of greatest benefit in the Nation's need for increasing the production of edible vegetable oils.

That varieties differ in the oil content of the cottonseed has been demonstrated. In normal peace times, however, when the value of the lint overshadowed the value of the seed for oil or protein, little attention was given to selecting varieties for high oil content. A wartime research program to aid the breeder in selecting varieties for high oil content and to help the farmer choose those that will give a high acre yield of oil has been inaugurated. The percentage of oil in cottonseed is known to be heritable and, notwithstanding soil and climatic influences that affect the oil content of seed for certain localities or seasons, the best variety with respect to oil content will still be the best for all localities.

This program has been under way such a short time that varietal studies are not yet sufficiently complete to make general varietal recommendations possible, but the possibility of choice is an important point for the farmer to keep in mind. It can be recommended, however, that the grower have his cottonseed analyzed for oil and protein content, so that he may profit from the extra care that he has taken to produce a more valuable product and one that will make the maximum contribution to the war program.

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Table 2.—Results of experiments at Hamlet, N. C., in the use of potash for increasing yields of cottonseed oil

FERTILIZER— 600 POUNDS OF N - P - K (Percentage of each)	YIELD OF COTTONSEED OIL—			
	From healthy plants		From diseased plants	
	In dry- delinted seed	In seed cotton	In dry- delinted seed	In seed cotton
	Percent	Percent	Percent	Percent
6-8-0	21.03	10.01	16.67	7.71
6-8-4	23.30	11.08	20.11	9.55
6-8-8	24.44	11.64	21.93	10.35
Increase from first incre- ment of potash	2.27	1.07	3.44	1.84
Increase from second in- crement of potash	1.14	.56	1.82	.80
Total increase	3.41	1.63	5.26	2.64

from this disease but also produce increased yields of seed cotton and enlarged acre yields of cottonseed oil. Unpublished results of the average performance of three varieties, in a regional wilt variety test conducted from 1937 to 1939 by cooperating State and Federal workers on a soil at Hamlet, N. C., where fusarium wilt had been severe and potash was badly depleted, are shown in table 2.

This test represents a case where the percentage of oil in the seed was not raised proportionately so much by the second increase in potash (4 to 8 percent) as by the first (0 to 4 percent), a condition where the potash was not quite so nearly exhausted from the soil in the locality concerned as in the test at Tifton, Ga.

Over and above the benefit obtained through control of the wilt disease, these applications of potash have given a large increase in the percentage of oil in the cottonseed. Yields were also markedly increased by the applications, but since part

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Additional Sources of Information

CARTTER, J. L., and HOPPER, T. H.

1942. INFLUENCE OF VARIETY, ENVIRONMENT, AND FERTILITY LEVEL ON THE CHEMICAL COMPOSITION OF SOYBEAN SEED. U. S. Dept. Agr. Tech. Bul. 787, 66 pp., illus.

COTTON DISEASE COUNCIL, COTTON SEEDLING DISEASE COMMITTEE.

1943. WAR RECOMMENDATIONS FOR HARVEST, STORAGE, AND TREATMENT OF COTTON-SEED. U. S. Dept. Agr., Bur. Plant Indus. 7 pp. [Processed.]

GARNER, W. W., ALLARD, H. A., and FOUBERT, C. L.

1914 OIL CONTENT OF SEEDS AS AFFECTED BY THE NUTRITION OF THE PLANT. JOUR. Agr. Res. 3: 227-249.

GIEGER, M.

1941. THE EFFECT OF FERTILIZATION AND CULTURAL PRACTICES ON THE OIL AND AMMONIA CONTENT OF COTTONSEED GROWN ON YAZOO-MISSISSIPPI DELTA SOILS. JOUR. Agr. Res. 63: 49-54.

HANCOCK, N. I.

1942. FACTORS IN THE BREEDING OF COTTON FOR INCREASED OIL AND NITROGEN CONTENT. Tenn. Agr. Expt. Sta. Cir. 79, [7] pp.

O'KELLY, J. F., HULL, W. W., and GIEGER, M.

1933. EFFECTS OF VARYING AMOUNTS OF POTASH ON OIL AND PROTEIN AND ON THE WEIGHT AND PERCENTAGE OF COTTONSEED. Miss. Agr. Expt. Sta. Tech. Bul. 20, 8 pp., illus.

SEALE, C. C.

1942. STUDIES IN OIL FORMATION IN THE V. 135 AND M. S. 1. VARIETIES OF SEA ISLAND COTTON IN ST. VINCENT, B. W. I. Trop. Agr. (Trinidad) 19: 210-214, illus.

SIEVERS, A. F., and LOWMAN, M. S.

1932. A STUDY OF COTTONSEED WITH REFERENCE TO VARIETAL CHARACTERISTICS AND SOURCES OF PRODUCTION. U. S. Dept. Agr., Bur. Plant Indus. 12 pp. [Processed.]

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of this resulted from disease control, the acre yield of oil is not shown.

Recommendations for fertilizers take into consideration the quantity needed to give an optimum yield of seed cotton, whether it be nitrogen, phosphorus, or potash and whether these elements are needed singly or in combination. Regardless of increase in percentage of oil within the seed, an increase in seed cotton means an increased acre yield of oil.

The importance of adequate applications of potash for increasing the acre yield of oil cannot be overemphasized, and it may be pointed out that while potash is usually applied prior to planting, it may be effectively used as a side dressing to the young plants. If previous crops have indicated a need for potash, it is highly important that the cotton grower supply this need. The supplies of potash and phosphorus are adequate to meet legitimate needs and should be wisely employed to increase the production of oil, food, and other needed products.

Select Cotton Varieties Best

Adapted to High Acre Yields

The choice of the variety or strain of cotton that will give the farmer the highest acre yield of oil depends mainly on three factors: (1) The acre yield of seed cotton, (2) the percentage of lint (or percentage of seed), and (3) the relative oil content of the seed. In a given group of varieties adaptable to the farmer's soil conditions considerable choice is possible. If acre yield of seed cotton and the percentage of lint are the same for several varieties of equal acre value, then choosing that variety with the highest percentage of oil in the seed would automatically insure a high acre

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Listen to Department of Agriculture radio network broadcasts for facts about wartime farming and home-making.

The NATIONAL FARM AND HOME HOUR gives farmers facts from the Department of Agriculture about the changing war needs for their products, information on Government programs to help meet their production goals, and policy discussions by our agricultural war leaders. It gives homemakers facts about food supplies, ideas on how to save food and clothing, and suggestions on keeping their families well fed under rationing.

CONSUMER TIME presents a dramatized story and discussion combined with the expert advice of a guest authority. These broadcasts present to the consumer the latest facts on conservation, nutrition, rationing, and the wise purchase and use of food, clothing, and household equipment, together with practical tips on wartime living.

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10:15 a. m. Mountain War Time.
9:15 a. m. Pacific War Time.

Consumer Time is available to all NBC stations. Consult radio schedule in local newspapers for stations carrying the program.

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